CS530
Introduction to Security Systems

Bill Cheng

http://merlot.usc.edu/cs530-s10

What Is Security

- What are you trying to secure?
  - system
  - network
  - data
- How to evaluate
  - can be difficult
  - what are the costs?
    - hardware & software
    - administration/management
  - balance costs to protect with costs of compromise
  - balance costs to compromise with time it to attacker
- Security vs. Risk Management
  - (cont..)

What Is Security (Cont...)

- Security vs. Risk Management (cont..)
  - prevent successful attacks vs. mitigate the consequences
  - an example of Risk Management: banks
    - difficult to defend against losses from robbery, credit card fraud, identity theft
    - solution: change laws, understand costs, buy insurance
- It's not all technical

What Do We Want From Security

- Protection
  - enforced by hardware
    - virtual memory system
    - user/kernel modes, rings 0-3, etc.
    - no stepping around, no I/O accesses
  - depends on trusted kernel
- Authentication
  - determining identity of principal
    - a principal can be a process or a user
    - can use an access matrix to specify what subjects can access what objects
- Integrity
  - (cont..)

What Do We Want From Security (Cont...)

- Integrity
  - authenticity of document
  - that it hasn't changes
- Confidentiality
  - that inappropriate information is not disclosed
- Availability
  - that the system continues to operate
  - that the system and data is reachable and readable
- Enforcement of policies
  - privacy
  - accountability and audit
  - payment

What Makes Up Security

- Basic services
  - Authentication
  - Authorization
  - Accounting (e.g., quota)
  - Audit
  - Assurance (e.g., software engineering, virus checkers)
  - Payment
  - Protection
  - Policy
    - rules about who can do what, at what cost
    - generally hard to define for an organization
  - Privacy (policy about individual)
  - Confidentiality (about data)

Security Weaknesses & Why We Are Not Secure

- Buggy code
  - buffer overrun
    - never use
- Protocols design failures
  - unspecified patterns
    - holes in the spec?
- Weak crypto
  - it is usually a good idea to use well understood ones
- "Social engineering"
  - (sent...)